

SEQUENCE LISTING

<110> Byrd, Devon
Youg, Alice
Hartley, James

<120> Compositions and Methods for Molecular Biology

<130> 0942.5230004

<150> US 60/400,704
<151> 2002-08-05

<150> US 60/403,095
<151> 2002-08-14

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<170> PatentIn version 3.2

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ttttacgttt ctggttcagc tttttgtac aaagttggca ttataaaaaa gcattgctca 180
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35 40 45

Glu His Asn Pro Leu Asn Arg Ile Glu Val Lys Gln His Leu Gly Asn
50 55 60

Asp Ala Gln Ser Leu Ala Leu Arg His Phe Arg His Leu Phe Ile Gln
65 70 75 80

Gln Gln Ser Glu Asn Arg Ser Ser Lys Ala Ala Val Arg Leu Pro Gly
85 90 95

Val Leu Cys Tyr Gln Val Asp Asn Leu Ser Gln Ala Ala Leu Val Ser
100 105 110

His Ile Gln His Ile Asn Lys Leu Lys Thr Thr Phe Glu His Ile Val
115 120 125

Thr Val Glu Ser Glu Leu Pro Thr Ala Ala Arg Phe Glu Trp Val His
130 135 140

Arg His Leu Pro Gly Leu Ile Thr Leu Asn Ala Tyr Arg Thr Leu Thr
145 150 155 160

Val Leu His Asp Pro Ala Thr Leu Arg Phe Gly Trp Ala Asn Lys His
165 170 175

Ile Ile Lys Asn Leu His Arg Asp Glu Val Leu Ala Gln Leu Glu Lys
180 185 190

Ser Leu Lys Ser Pro Arg Ser Val Ala Pro Trp Thr Arg Glu Glu Trp
195 200 205

Gln Arg Lys Leu Glu Arg Glu Tyr Gln Asp Ile Ala Ala Leu Pro Gln
210 215 220

Asn Ala Lys Leu Lys Ile Lys Arg Pro Val Lys Val Gln Pro Ile Ala

Thr Pro Leu Ile Ala Leu Ile Asn Arg Asp Asn Gly Ala Gly Val Pro
260 265 270

Asp Val Gly Glu Leu Leu Asn Tyr Asp Ala Asp Asn Val Gln His Arg
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Tyr Lys Pro Gln Ala Gln Pro Leu Arg Leu Ile Ile Pro Arg Leu His
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Leu Leu Val Ala Arg Val Phe Ser Leu Pro Glu Val Lys Lys Glu Asp
35 40 45

Glu His Asn Pro Leu Asn Arg Ile Glu Val Lys Gln His Leu Gly Asn
50 55 60

Asp Ala Gln Ser Gln Ala Leu Arg His Phe Arg His Leu Phe Ile Gln
65 70 75 80

Gln Gln Ser Glu Asn Arg Ser Ser Lys Ala Ala Val Arg Leu Pro Gly
85 90 95

Val Leu Cys Tyr Gln Val Asp Asn Leu Ser Gln Ala Ala Leu Val Ser
100 105 110

His Ile Gln His Ile Asn Lys Leu Lys Thr Thr Phe Glu His Ile Val
115 120 125

Thr Val Glu Ser Glu Leu Pro Thr Ala Ala Arg Phe Glu Trp Val His
130 135 140

Arg His Leu Pro Gly Leu Ile Thr Leu Asn Ala Tyr Arg Thr Leu Thr
145 150 155 160

Val Leu His Asp Pro Ala Thr Leu Arg Phe Gly Trp Ala Asn Lys His
165 170 175

Ile Ile Lys Asn Leu His Arg Asp Glu Val Leu Ala Gln Leu Glu Lys
180 185 190

Ser Leu Lys Ser Pro Arg Ser Val Ala Pro Trp Thr Arg Glu Glu Trp
195 200 205

Gln Arg Lys Leu Glu Arg Glu Tyr Gln Asp Ile Ala Ala Leu Pro Gln
210 215 220

Asn Ala Lys Leu Lys Ile Lys Arg Pro Val Lys Val Gln Pro Ile Ala
225 230 235 240

Arg Val Trp Tyr Lys Gly Asp Gln Lys Gln Val Gln His Ala Cys Pro
245 250 255

Thr Pro Leu Ile Ala Leu Ile Asn Arg Asp Asn Gly Ala Gly Val Pro
260 265 270

Asp Val Gly Glu Leu Leu Asn Tyr Asp Ala Asp Asn Val Gln His Arg
275 280 285

Tyr Lys Pro Gln Ala Gln Pro Leu Arg Leu Ile Ile Pro Arg Leu His
290 295 300

Leu Tyr Val Ala Asp
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<213> Salmonella typhimurium

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Leu Leu Ile Ala Arg Val Phe Ser Leu Pro Gln Val Thr Lys Glu Ala
35 40 45

Glu His Ala Pro Leu Asp Thr Ile Glu Val Thr Gln His Leu Gly Lys
50 55 60

Glu Ala Glu Ala Leu Ala Leu Arg His Tyr Arg His Leu Phe Ile Gln
65 70 75 80

Gln Gln Ser Glu Asn Arg Ser Ser Lys Ala Ala Val Arg Leu Pro Gly
85 90 95

Val Leu Cys Tyr Gln Val Asp Asn Ala Thr Gln Leu Asp Leu Glu Asn
100 105 110

Gln Ile Gln Arg Ile Asn Gln Leu Lys Thr Thr Phe Glu Gln Met Val
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130 135 140

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145 150 155 160

Leu Ile Asn Asn Pro Ala Thr Ile Arg Phe Gly Trp Ala Asn Lys His
165 170 175

Ile Ile Lys Asn Leu Ser Arg Asp Glu Val Leu Ser Gln Leu Lys Lys
180 185 190

Ser Leu Ala Ser Pro Arg Ser Val Pro Pro Trp Thr Arg Glu Gln Trp
195 200 205

Gln Phe Lys Leu Glu Arg Glu Tyr Gln Asp Ile Ala Ala Leu Pro Gln
210 215 220

Gln Ala Arg Leu Lys Ile Lys Arg Pro Val Lys Val Gln Pro Ile Ser
225 230 235 240

Arg Ile Trp Tyr Lys Gly Gln Gln Lys Gln Val Gln His Ala Cys Pro
245 250 255

Thr Pro Ile Ile Ala Leu Ile Asn Thr Asp Asn Gly Ala Gly Val Pro
260 265 270

Asp Ile Gly Gly Leu Glu Asn Tyr Asp Ala Asp Asn Ile Gln His Arg
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Phe Lys Pro Gln Ala Gln Pro Leu Arg Leu Ile Ile Pro Arg Leu His
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Leu Tyr Val Ala Asp
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Leu Leu Ile Ala Ser Val Phe Ser Leu Pro Gln Val Thr Lys Glu Ala
 35 40 45

Glu His Ala Pro Leu Asp Thr Ile Glu Val Thr Gln His Leu Gly Lys
 50 55 60

Glu Ala Glu Ala Leu Ala Leu Arg His Tyr Arg His Leu Phe Ile Gln
 65 70 75 80

Gln Gln Ser Glu Asn Arg Ser Ser Lys Ala Ala Val Arg Leu Pro Gly
 85 90 95

Val Leu Cys Tyr Gln Val Asp Asn Ala Thr Gln Leu Asp Leu Glu Asn
 100 105 110

Gln Val Gln Arg Ile Asn Gln Leu Lys Thr Thr Phe Glu Gln Met Val
 115 120 125

Thr Val Glu Ser Gly Leu Pro Ser Ala Ala Arg Phe Glu Trp Val His
 130 135 140

Arg His Leu Pro Gly Leu Ile Thr Leu Asn Ala Tyr Arg Thr Leu Thr
 145 150 155 160

Leu Ile Asn Asn Pro Ala Thr Ile Arg Phe Gly Trp Ala Asn Lys His
 165 170 175

Ile Ile Lys Asn Leu Ser Arg Asp Glu Val Leu Ser Gln Leu Lys Lys
 180 185 190

Ser Leu Ala Ser Pro Arg Ser Val Pro Pro Trp Thr Arg Glu Gln Trp
 195 200 205

Gln Phe Lys Leu Glu Arg Glu Tyr Gln Asp Ile Ala Ala Leu Pro Gln
 210 215 220

Gln Ala Lys Leu Lys Ile Lys Arg Pro Val Lys Val Gln Pro Ile Ala
 225 230 235 240

Arg Ile Trp Tyr Lys Gly Gln Gln Lys Gln Val Gln His Ala Cys Pro
 245 250 255

Ser Pro Ile Ile Ala Leu Ile Asn Thr Asp Asn Gly Ala Gly Val Pro
 260 265 270

Asp Ile Gly Gly Leu Glu Asn Tyr Asp Ala Asp Asn Ile Gln His Arg
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Phe Lys Pro Gln Ala Gln Pro Leu Arg Leu Ile Ile Pro Arg Leu His
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Leu Tyr Val Ala Asp
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Leu Leu Ile Ala Ser Val Phe Ser Leu Pro Gln Val Thr Lys Glu Ala
 35 40 45

Glu His Ala Pro Leu Asp Thr Ile Glu Val Thr Gln His Leu Gly Lys
 50 55 60

Glu Ala Glu Ala Leu Ala Leu Arg His Tyr Arg His Leu Phe Ile Gln
 65 70 75 80

Gln Gln Ser Glu Asn Arg Ser Ser Lys Ala Ala Val Arg Leu Pro Gly
 85 90 95

Val Leu Cys Tyr Gln Val Asp Asn Ala Thr Gln Leu Asp Leu Glu Asn
100 105 110

Gln Val Gln Arg Ile Asn Gln Leu Lys Thr Thr Phe Glu Gln Met Val
115 120 125

Thr Val Glu Ser Gly Leu Pro Ser Ala Ala Arg Phe Glu Trp Val His
130 135 140

Arg His Leu Pro Gly Leu Ile Thr Leu Asn Ala Tyr Arg Thr Leu Thr
145 150 155 160

Leu Ile Asn Asn Pro Ala Thr Ile Arg Phe Gly Trp Ala Asn Lys His
165 170 175

Ile Ile Lys Asn Leu Ser Arg Asp Glu Val Leu Ser Gln Leu Lys Lys
180 185 190

Ser Leu Ala Ser Pro Arg Ser Val Pro Pro Trp Thr Arg Glu Gln Trp
195 200 205

Gln Phe Lys Leu Glu Arg Glu Tyr Gln Asp Ile Ala Ala Leu Pro Gln
210 215 220

Gln Ala Lys Leu Lys Ile Lys Arg Pro Val Lys Val Gln Pro Ile Ala
225 230 235 240

Arg Ile Trp Tyr Lys Gly Gln Gln Lys Gln Val Gln His Ala Cys Pro
245 250 255

Ser Pro Ile Ile Ala Leu Ile Asn Thr Asp Asn Gly Ala Gly Val Pro
260 265 270

Asp Ile Gly Gly Leu Glu Asn Tyr Asp Ala Asp Asn Ile Gln His Arg
275 280 285

Phe Lys Pro Gln Ala Gln Pro Leu Arg Leu Ile Ile Pro Arg Leu His
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Leu Tyr Val Ala Asp
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Leu Leu Ala Gly Arg Val Phe Glu Leu Pro Ala Ile Gly Lys Asp Ala
35 40 45

Glu His Asp Pro Leu Ala Thr Ile Pro Val Val Gln His Ile Gly Lys
50 55 60

Thr Ala Leu Ala Arg Ala Leu Arg His Tyr Ser His Leu Phe Ile Gln
65 70 75 80

Gln Gln Ser Glu Asn Arg Ser Ser Lys Ala Ala Val Arg Leu Pro Gly
85 90 95

Ala Ile Cys Leu Gln Val Thr Ala Ala Glu Gln Gln Asp Leu Leu Ala
100 105 110

Arg Ile Gln His Ile Asn Ala Leu Lys Ala Thr Phe Glu Lys Ile Val
115 120 125

Thr Val Asp Ser Gly Leu Pro Pro Thr Ala Arg Phe Glu Trp Val His
130 135 140

Arg His Leu Pro Gly Leu Ile Thr Leu Ser Ala Tyr Arg Thr Leu Thr
145 150 155 160

Pro Leu Val Asp Pro Ser Thr Ile Arg Phe Gly Trp Ala Asn Lys His
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Val Ile Lys Asn Leu Thr Arg Asp Gln Val Leu Met Met Leu Glu Lys
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Ser Leu Gln Ala Pro Arg Ala Val Pro Pro Trp Thr Arg Glu Gln Trp
195 200 205

Gln Ser Lys Leu Glu Arg Glu Tyr Gln Asp Ile Ala Ala Leu Pro Gln
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Arg Ala Arg Leu Lys Ile Lys Arg Pro Val Lys Val Gln Pro Ile Ala
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Arg Val Trp Tyr Ala Gly Glu Gln Lys Gln Val Gln Tyr Ala Cys Pro
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Ser Pro Leu Ile Ala Leu Met Ser Gly Ser Arg Gly Val Ser Val Pro
260 265 270

Asp Ile Gly Glu Leu Leu Asn Tyr Asp Ala Asp Asn Val Gln Tyr Arg
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Tyr Lys Pro Glu Ala Gln Ser Leu Arg Leu Leu Ile Pro Arg Leu His
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Leu Trp Leu Ala Ser Glu
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<210> 77
<211> 294
<212> PRT
<213> Proteus vulgaris

<400> 77

Met Asp Leu Lys Lys Thr Phe Glu Gln Leu Thr Asp Asp Leu Leu Ala
1 5 10 15

Leu Lys Met Leu Ile Ser Gly Ser Ser Pro Leu Phe Ser Gln Val Ser
20 25 30

Asp Ile Pro Pro Val Leu Arg Gly Asp Glu His Leu Pro Ile Ser Tyr
35 40 45

Val Ala Pro Asp His Leu Tyr Gly His Glu Ala Ile Gln Lys Ala Val
50 55 60

Asp Ile Trp Ser Asp Leu His Ile Lys His Asp Phe Ser Gln Lys Ser
65 70 75 80

Ala Arg Arg Ala Ser Gly Val Leu Trp Phe Pro Ser Glu Asp Asn Ala
85 90 95

Phe Thr Val Glu Leu Val Arg Leu Leu Ser Gln Ile Asn Ala Leu Lys
100 105 110

Lys Ser Ile Glu Thr His Ile Ile Thr Thr Tyr Gln Thr Arg Ser Ala
115 120 125

Arg Phe Glu Ala Leu His Asn Gln Cys Ala Gly Val Leu Thr Leu His
130 135 140

Leu Tyr Arg Gln Ile Arg Trp Trp Lys Asp Glu His Ile Ser Ala Val
145 150 155 160

Arg Phe Ser Trp Gln Glu Lys Glu Ser Leu Leu Ile Pro Asp Lys Ala
165 170 175

Glu Leu Leu Val Arg Met Ser Lys Glu Gly Arg Glu Asp Gly Lys Lys
180 185 190

Glu Val Pro Leu Ala Leu Leu Met Lys Gln Ile Val Ser Val Pro Glu
195 200 205

Glu Arg Leu Arg Ile Arg Arg Arg Leu Lys Val Gln Pro Ser Ala Asn
210 215 220

Ile Ser Phe Arg Ser Glu Gln His Pro Thr Gly Lys Leu Thr Met Val
225 230 235 240

Thr Ala Pro Met Pro Phe Ile Ile Ile Gln Asn Glu Arg Pro Glu Val
245 250 255

Lys Met Leu Lys Ile Tyr Asp Ala Asn Glu Arg Ile Ser Arg Lys Arg
260 265 270

Arg Asn Asp Lys Val His Thr Glu Ile Leu Gly Thr Phe His Gly Glu
275 280 285

Ser Ile Glu Val Ile Ala
290

<210> 78
<211> 122
<212> PRT
<213> Bacillus subtilis

<400> 78

Met Lys Glu Glu Lys Arg Ser Ser Thr Gly Phe Leu Val Lys Gln Arg
1 5 10 15

Ala Phe Leu Lys Leu Tyr Met Ile Thr Met Thr Glu Gln Glu Arg Leu
20 25 30

Tyr Gly Leu Lys Leu Leu Glu Val Leu Arg Ser Glu Phe Lys Glu Ile
35 40 45

Gly Phe Lys Pro Asn His Thr Glu Val Tyr Arg Ser Leu His Glu Leu
50 55 60

Leu Asp Asp Gly Ile Leu Lys Gln Ile Lys Val Lys Lys Glu Gly Ala
65 70 75 80

Lys Leu Gln Glu Val Val Leu Tyr Gln Phe Lys Asp Tyr Glu Ala Ala
85 90 95

Lys Leu Tyr Lys Lys Gln Leu Lys Val Glu Leu Asp Arg Cys Lys Lys
100 105 110

Leu Ile Glu Lys Ala Leu Ser Asp Asn Phe
115 120

<210> 79
<211> 311
<212> PRT
<213> Yersinia pestis

<400> 79

Met Asn Lys Tyr Asp Leu Ile Glu Arg Met Asn Thr Arg Phe Ala Glu
1 5 10 15

Leu Glu Val Thr Leu His Gln Leu His Gln Gln Leu Asp Asp Leu Pro
20 25 30

Leu Ile Ala Ala Arg Val Phe Ser Leu Pro Glu Ile Glu Lys Gly Thr
35 40 45

Glu His Gln Pro Ile Glu Gln Ile Thr Val Asn Ile Thr Glu Gly Glu
50 55 60

His Ala Lys Lys Leu Gly Leu Gln His Phe Gln Arg Leu Phe Leu His
65 70 75 80

His Gln Gly Gln His Val Ser Ser Lys Ala Ala Leu Arg Leu Pro Gly
85 90 95

Val Leu Cys Phe Ser Val Thr Asp Lys Glu Leu Ile Glu Cys Gln Asp
100 105 110

Ile Ile Lys Lys Thr Asn Gln Leu Lys Ala Glu Leu Glu His Ile Ile
115 120 125

Thr Val Glu Ser Gly Leu Pro Ser Glu Gln Arg Phe Glu Phe Val His
130 135 140

Thr His Leu His Gly Leu Ile Thr Leu Asn Thr Tyr Arg Thr Ile Thr
145 150 155 160

Pro Leu Ile Asn Pro Ser Ser Val Arg Phe Gly Trp Ala Asn Lys His
165 170 175

Ile Ile Lys Asn Val Thr Arg Glu Asp Ile Leu Leu Gln Leu Glu Lys
180 185 190

Ser Leu Asn Ala Gly Arg Ala Val Pro Pro Phe Thr Arg Glu Gln Trp
195 200 205

Arg Glu Leu Ile Ser Leu Glu Ile Asn Asp Val Gln Arg Leu Pro Glu
210 215 220

Lys Thr Arg Leu Lys Ile Lys Arg Pro Val Lys Val Gln Pro Ile Ala
225 230 235 240

Arg Val Trp Tyr Gln Glu Gln Gln Lys Gln Val Gln His Pro Cys Pro
245 250 255

Met Pro Leu Ile Ala Phe Cys Gln His Gln Leu Gly Ala Glu Leu Pro
260 265 270

Lys Leu Gly Glu Leu Thr Asp Tyr Asp Val Lys His Ile Lys His Lys
275 280 285

Tyr Lys Pro Asp Ala Lys Pro Leu Arg Leu Leu Val Pro Arg Leu His
290 295 300

Leu Tyr Val Glu Leu Glu Pro
305 310

<210> 80

<211> 294

<212> PRT

<213> Artificial Sequence

<220>

<223> IncT plasmid R394 Ter-binding protein

<400> 80

Met Asp Leu Lys Lys Thr Phe Glu Gln Leu Thr Asp Asp Leu Leu Ala
1 5 10 15

Leu Lys Met Leu Ile Ser Gly Ser Ser Pro Leu Phe Ser Gln Val Ser
20 25 30

Asp Ile Pro Pro Val Leu Arg Gly Asp Glu His Leu Pro Ile Ser Tyr
35 40 45

Val Ala Pro Asp His Leu Tyr Gly His Glu Ala Ile Gln Lys Ala Val
50 55 60

Asp Ile Trp Ser Asp Leu His Ile Lys His Asp Phe Ser Gln Lys Ser
65 70 75 80

Ala Arg Arg Ala Ser Gly Val Leu Trp Phe Pro Ser Glu Asp Asn Ala
85 90 95

Phe Thr Val Glu Leu Val Arg Leu Leu Ser Gln Ile Asn Ala Leu Lys
100 105 110

Lys Ser Ile Glu Thr His Ile Ile Thr Thr Tyr Gln Thr Arg Ser Ala
115 120 125

Arg Phe Glu Ala Leu His Asn Gln Cys Ala Gly Val Leu Thr Leu His
130 135 140

Leu Tyr Arg Gln Ile Arg Trp Trp Lys Asp Glu His Ile Ser Ala Val
145 150 155 160

Arg Phe Ser Trp Gln Glu Lys Glu Ser Leu Leu Ile Pro Asp Lys Ala
165 170 175

Glu Leu Leu Val Arg Met Ser Lys Glu Gly Arg Glu Asp Gly Lys Lys
180 185 190

Glu Val Pro Leu Ala Leu Leu Met Lys Gln Ile Val Ser Val Pro Glu
195 200 205

Glu Arg Leu Arg Ile Arg Arg Arg Leu Lys Val Gln Pro Ser Ala Asn
210 215 220

Ile Ser Phe Arg Ser Glu Gln His Pro Thr Gly Lys Leu Thr Met Val
225 230 235 240

Thr Ala Pro Met Pro Phe Ile Ile Ile Gln Asn Glu Arg Pro Glu Val
245 250 255

Lys Met Leu Lys Ile Tyr Asp Ala Asn Glu Arg Ile Ser Arg Lys Arg
260 265 270

Arg Asn Asp Lys Val His Thr Glu Ile Leu Gly Thr Phe His Gly Glu
275 280 285

Ser Ile Glu Val Ile Ala
290

<210> 81
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> nuclear localization sequence

<400> 81

Pro Lys Lys Lys Arg Lys Val
1 5

<210> 82
<211> 10
<212> PRT
<213> Influenza virus

<400> 82

Ala Ala Phe Glu Asp Leu Arg Val Leu Ser
1 5 10

<210> 83
<211> 5
<212> PRT
<213> Adenovirus

<400> 83

Lys Arg Pro Arg Pro
1 5

<210> 84
<211> 5
<212> PRT
<213> Artificial Sequence

<220>
<223> lysosomal targeting sequence

<400> 84

Lys Phe Glu Arg Gln
1 5

<210> 85
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> mitochondrial targeting sequence

<400> 85

Met Leu Ser Leu Arg Gln Ser Ile Arg Phe Phe Lys Pro Ala Thr Arg

1

5

10

15

<210> 86

<211> 4

<212> PRT

<213> Artificial Sequence

<220>

<223> Factor Xa cleavage site

<400> 86

Ile Glu Gly Arg

1

<210> 87

<211> 4

<212> PRT

<213> Artificial Sequence

<220>

<223> thrombin cleavage site

<400> 87

Leu Val Pro Arg

1